AM-1
EOC COMPATIBILITY TEST 1
(ECT1)
WORK PLAN

1 November, 1996

1.0 Purpose

The purpose of this work plan is to define roles and responsibilities, identify work items, and establish a management routine to complete the first AM-1 to EOC Compatibility Test (ECT1) in January of 1997.

2.0 ECT1 Test Team

2.1 Roles and Responsibilities

The ECT1 Test Team will be lead by the ESDIS System Integration and Test (SI&T-GSFC 505) supported by the organizations and individuals listed in Exhibit 1 below.

Organization and Representatives	Responsibilities
ESDIS SI&T (GSFC 505) Glenn Iona Phil Parker	• EGS Test Director - overall coordination of preparations and direction of execution in the EGS. • Coordinate and schedule institutional support • Translate LM recommended / required operational sequence into test timeline. • Produce top level script • Produce Test Reports
LMMS-VF I&T LMMS-VF FOE Gene Keeling	• AM-1 Spacecraft Test Director - VEHICLE SAFETY! • Enumeration of S/C capabilities and restrictions for test • S/C movement and test preparations • S/C I&T procedures to support test preparations and test timeline
AM-1 Project Ed Chang	• Provide technical review of ECT1 preparations from the AM-1 project perspective.(Sanity check) • Local GSFC liaison to Lockheed Martin spacecraft contractor at VFPA
ESDIS EOC (GSFC 510) Dennis Small	• Technical review of ECT1 preparations from the EOC perspective.(Sanity check) • Liaison to Lockheed Martin (EOC Development) to insure EOC development will support ECT1 • EOC Facility and System Readiness to support ECT1
EDOS Project (GSFC 510) Bonnie Seaton	• Technical review of ECT1 preparations from the EDOS perspective.(Sanity check) • EDOS Facility and System Readiness to support ECT1
AM-1 Flight Operations (Lockheed Martin - AM-1 Flight Operations) Bob Kozon Ron Jones	• Produce ECL procedures to support the test timeline • Provide FOT Test Director during test • Provide EOC Operators during test • Submit Nascom briefing message (if required)

EXHIBIT 1 - ECT1 Test Team Roles and Responsibilities

Organization and Representatives	Responsibilities
EBnet (GSFC 540) Chris Garman Paul Sullivan	• Technical review of ECT1 preparations from an EBnet perspective. • Liaison with EDOS, EOC, and SCS to ensure connectivity to support ECT1. • EBnet operations and maintenance support to ECT1.
ECS / FOS Development Debbie Dunn Carol Cachulski	• Review EOC procedures to verify correctness and the ability of FOS Release A to support ECT1. • Developer support in the EOC for EOC procedure dry runs and ECT1 execution.
ECS / FOS I&T (HITS) Greg Dvornicky	• EOC technical expertise • Script and procedure review
EGS I&T / ETS (GSFC 505 /CNMOS) Henry Zaveleta	• ETS expertise - prepare test data for dry runs with ETS • ETS Operations during ECT1 dry runs

EXHIBIT 1(cont.) - ECT1 Test Team Roles and Responsibilities

2.2 Test Management Routine

2.2.1 Management of Preparations

The ECT1 Test Team will meet on a regular basis set by the EGS Test Director. The EGS Test Director will chair these meetings. Team members will report status of preparations; issues and problems will be reported and actions will be assigned for resolution.

The high level procedures for the test and the current ECT1 preparation schedule will be available for review on the WWW on the EGS I&T Contractor home page (http://fairmont.ivv.nasa.gov/it/library.html)

Comments on the ECT1 plan and procedures document may be submitted to Phil Parker at any time via e-mail (pkp@cclink.gblt.inmet.com) or by phone (301-982-5414 or 301-982-1059 ext 255).

Comments of the ECT1 preparation schedule may be submitted to Jane Fisher at any time via e-mail (ejf@cclink.gblt.inmet.com) or by phone (301-982-5414 or 301-982-1059 ext 243)

2.2.2 Test Execution Management

ECT1 will be executed in accordance with the following ground rules:

- ECT1 is not an acceptance or certification test - there are no requirements to be verified and no pass/fail criteria. ECT1 is an initial, exploratory test intended to exercise early command and telemetry functions and expose compatibility problems between the AM-1 spacecraft and the EOC so that corrective action can be taken. The priorities for ECT1 are:

    (1) AM-1 spacecraft safety
    (2) Attainment of ECT1 primary objectives listed in the test package
    (3) Attainment of ECT1 secondary objectives listed in the test package
    (4) Opportunity testing to gather such data as may be useful to either EOC or AM-1 engineers to insure flight system - ground system compatibility and mission success.

- The Spacecraft Test Director in charge at the S/C I&T Facility has the authority to stop the test at any time if spacecraft safety is in question.
- The EGS, FOT, and Spacecraft Test Directors may, after consultation and mutual agreement, deviate from the procedures as necessary to respond to unanticipated problems, test procedure errors, or opportunities to collect data of interest to flight and ground system developers without compromising vehicle safety. All such deviations will be reported in the ECT1 test report.
- On the net briefings and de-briefings will be held before and after test execution. The EGS I&T Contractor will produce a “quick look” test report within 48 hours of test completion and the final ECT1 test report within 2 weeks of test completion.

Lines of authority and concurrence for ECT1 are shown in Exhibit 2.

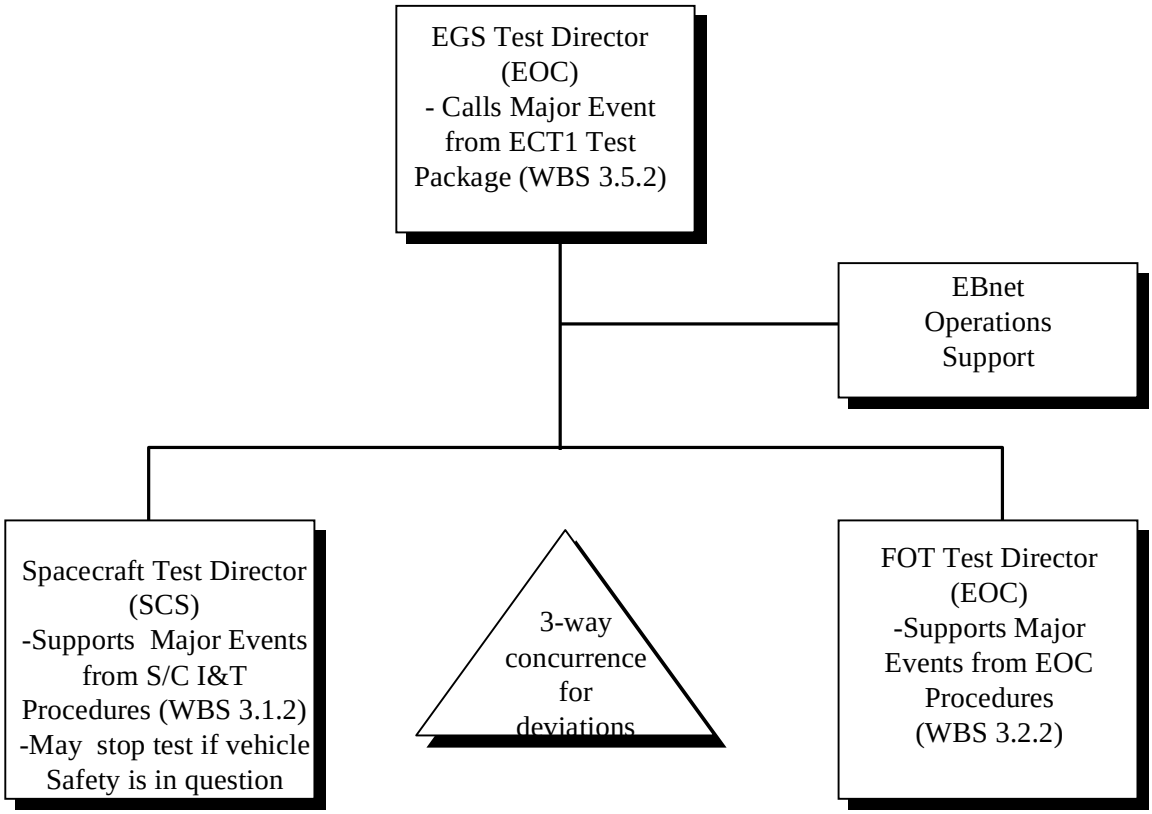

Exhibit 2: ECT1 Execution lines of authority

2.3 Test Documentation

The documentation suite is divided into three groups: Planning Documents, Procedures, and Reports.

2.3.1 Planning Documents

The planning documents for ECT1 consists of this work plan, the ECT1 schedule, and the ECT1 Test timeline.

The ECT1 Test Timeline (WBS 3.5.1) will be established following the Spacecraft Capabilities and Limitations Conference. The timeline will identify all the major events for ECT1 with a description of the event and an estimated start time and duration. The timeline will drive the development of the top level procedures, spacecraft I&T procedures, and EOC procedures.

The ECT1 schedule will be maintained in Microsoft Project™ by the EGS I&T contractor.

2.3.2 Procedure Documents

Three procedure documents will be developed; The ECT1 Test Package, the Spacecraft I&T Procedures, and the EOC Procedures.

The ECT1 Test Package (WBS 3.5.2) is the controlling procedure used by the EGS Test Director to guide the overall execution of the test. It provides major execution steps and points to the corresponding sections of the spacecraft I&T procedures and EOC procedures for details. The format and content of ECT1 Test Package is given below:

Background Information

Test Objectives - Primary and Secondary Objectives sufficiently detailed to support timeline generation.

Test Configuration - Block diagrams showing data flow paths at a high level and at detailed levels at Valley Forge and within the EOC, identification of software configuration for EDOS and ECS software in the EOC.

Participants and Support Requirements - Identifies test participants, voice and data communications circuit designations, Equipment and Software requirements, test tools, and provides a test data description.

Test Script - the top level procedure followed by the EGS Test Director, supporting the test timeline and referencing detailed spacecraft I&T and EOC procedures.

The Spacecraft I&T Procedures (WBS 3.1.2) will be developed by LMMS - VF I&T and will consist of the necessary OASIS command language procedures and detailed Spacecraft Checkout Station operating procedures to support the events on the test timeline.

The EOC Test Procedures (WBS 3.2.2) will be developed LMSMS FOT and will consist of the necessary EOC Command Language (ECL) procedures and detailed EOC operating procedures to support the events on the test timeline.

2.3.3 Reports

Three reports will be produced: the Command Data Base Validation Report, the "Quick Look" Test Report, and the final ECT1 Test Report

The **Command Data Base Validation Report** will be produced by LMMS - VF I&T following completion of the Command Data Base Validation (WBS 3.1.4) It will list any validation discrepancies found and report corrective action taken.

The **"Quick Look" Test Report** (WBS 3.5.3) will be produced by the EGS I&T contractor within 48 hours of test completion. It will include a short summary of the test events, functions successfully demonstrated and problems encountered.

The **ECT1 Final Test Report** (W2BS 3.5.3) will be produced by the EGS I&T contractor within two weeks of test completion. The format and content for the final test report is given below:

Executive Summary - a brief summary evaluation of the test and implications for the execution of the ECT2, the next test in the series.

Narrative Report - a brief narrative of the test activities, highlighting major events.

Test Objective Status - whether each objective was successfully reached or not, with reasons for any objectives not met.

Deviations - any deviations from the ECT1 procedures and the reasons for those deviations.

Problems encountered - a list of hardware and software anomalies encountered, corrective action taken, and problem reports submitted, where necessary.

Lessons Learned - lessons learned concerning test planning and execution, and flight and ground system operations to be carried forward to ECT2 for process improvement.

Appendix - copies of problem reports (NCRs, hardware problem reports, etc.) submitted as a result of ECT1 execution.

The test documentation suite for ECT1 is shown in Exhibit 3.

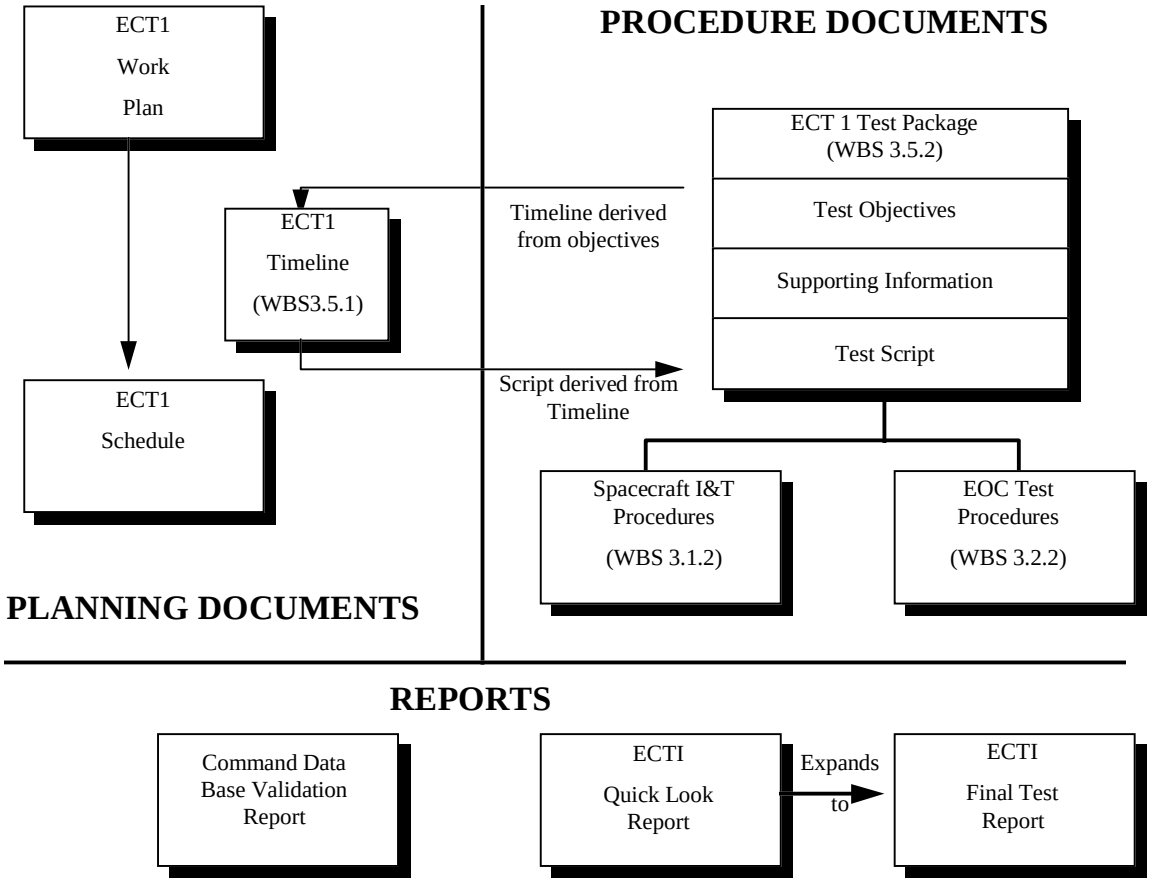

Exhibit 3: ECT1 Document Suite

3.0 Work Breakdown Structure

3.1 Spacecraft Preparations [Lockheed-Martin - LMMS-VF]

Spacecraft preparations will be conducted in accordance with detailed I&T procedures under the direction of LM/VFPA. Items listed here are major events of interest to all participants.

3.1.1 Spacecraft Capabilities and Limitations Conference

LM/VFPA will brief the ECT1 team on the capabilities and limitations of the AM-1 spacecraft in the ECT1 time frame and provide a recommended operational sequence of events for ECT1. This briefing will include identification of prohibited and allowed commands for ECT1 and the identification of any other operational constraints on the test.

3.1.2 Develop ECT1 S/C I&T Facility Console Procedures

LM/VFPA will develop and check out S/C I&T Facility console procedures for ECT1.

3.1.3 ECT1 S/C I&T Facility Dry Run

LM/VFPA will dry run the ECT1 S/C I&T Facility procedures a minimum of two weeks prior to ECT1.

3.1.4 Spacecraft Command Data Base Validation

LM/VFPA, with the support of the FOT, will validate the command data base to be used for ECT1 prior the Spacecraft I&T Facility Dry Run. A Command Data Base Validation Report will be issued upon completion of this task.

3.1.5 EOC to SCS Dry Run

The day prior to the execution of ECT1, the EOC will dry run the ECT1 procecdure with the SCS, insuring that all commands to be executed in ECT1 pass validation by the SCS.

3.2 EOC Preparations [AM-1 Flight Operations Team (LM/FOT)]

3.2.1 EOC Configuration Definition

LM/FOT will identify primary and backup processing strings (logical strings) for ECT1.

3.2.2 ECL and Detailed Console Procedure Development

LM/FOT will develop ECL procedures and other detailed console procedures to support the test time-line (see WBS 3.5.1).

3.2.3 EOC hardware and software installation and check-out

LM/FOT will monitor EOC hardware and software installation activities conducted by the FOS developer to insure equipment readiness to support ECT1. This should include a PDB/ODB validation to be conducted within two weeks of ECT1.

3.2.4 EOC Procedure Dry Run

LM/FOT will dry run the EOC ECL and console procedures for ECT1 a minimum of two weeks prior to ECT1. These procedures will be dry run against the ETS Multi Purpose Simulator (MPS.) Plans will be made to conduct this dry run under two different configurations:

(a) ETS to EOC without EDOS support

The ETS will generate and transmit test data in the form of EDOS Service Units (EDU) directly to the EOC. The ETS MPS will receive command data directly from the EOC.

(b) ETS to EDOS to EOC

The ETS will generate and transmit test data in the form of AM-1 Channel Access Data Units (CADU) to the EDOS LZPS. EDOS will form and transmit EDU to the EOC. EOC will transmit command data to the forward link processing element of EDOS for forwarding to the ETS MPS as Command Link Transmission Units (CLTU).

The intent is to execute the dry run under configuration (a) first and then with configuration (b). If schedule or resource constraints don't allow for both dry runs, a single dry run in configuration (b) will be executed.

3.3 Communications Preparations [GSFC 540]

3.3.1 Voice Circuit Installation

The EGS Test Director will coordinate with GSFC 540 to insure that voice (SCAMA) circuits to support ECT1 are installed and checked out at least 30 days prior to ECT1. This will include SCAMA "drops" at the EOC, EDOS LZP, and SCS in Valley Forge.

3.3.2 VFPA EBnet Connection Installation

EBnet will install and test the EBnet connection to VFPA.

3.3.3 EOC EBnet Connection Installation

EBnet will install and test the EBnet connection to the EOC.

3.3.4 EDOS EBnet Connection Installation

EBnet will install and test the EBnet connection to EDOS.

3.3.5 ETS EBnet Connection Installation

EBnet will install and test the EBnet connection to the ETS in GSFC Buildings 25 and 32..

3.3.6 VFPA - EDOS - EOC Connectivity Checks

EBnet will conduct circuit connectivity checks between VFPA, EDOS, and EOC
(a) Upon completion of node installation and test and,
(b) Within 1 week prior to the start of ECT1.

3.4 ETS Support [CNMOS]

3.4.1 ETS Telemetry Data Preparation

CNMOS will generate and verify ETS scripts for the production of telemetry to support ECT1.

3.4.2 EOC Dry Run Support

CNMOS will provide ETS operator support for the EOC Dry Run (see 3.2.4)

3.5 EGS Test Director Support [EGS I&T Contractor]

3.5.1 Test Timeline Generation

From the recommended operational sequence provided by LM/VFPA, the EGS I&T contractor will generate a timeline for ECT1 identifying major events to occur at the EOC and the S/C I&T Facility. This timeline will be included in the ECT1 Test Package.

3.5.2 ECT1 Test Package Generation

The EGS I&T Contractor will develop the ECT1 Test Package, including the top level ECT1 test script.

3.5.3 ECT1 Test Reports

The EGS I&T Contractor will produce a “quick look” ECT1 Test Report within 48 hours of ECT1 completion and a final report within two weeks of completion.

3.6 EDOS Preparations [EDOS Project]

3.6.1 EDOS Version 2 Installation and Checkout

The EDOS Project will complete EDOS Version 2 hardware and software installation and checkout in GSFC Building 32.

3.6.2 EDOS Version 2 Demonstration

The EDOS Project will demonstrate real time packet telemetry processing that will support ECT1 during the EDOS Version 2 demonstration.

4.0 Work Flow and Schedule

ECT1 task dependencies are shown in Exhibit 4. The current schedule for these activities will be maintained by the EGS I&T Contractor.

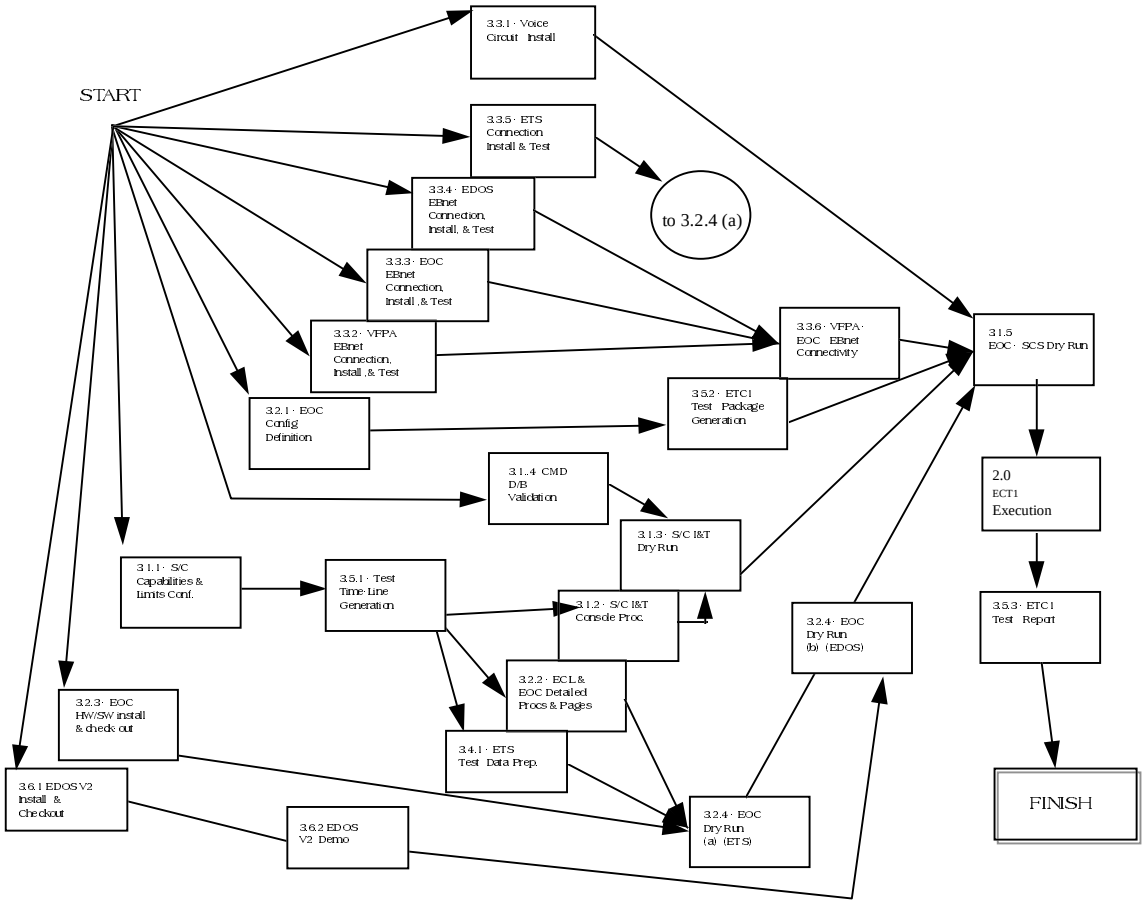

EXHIBIT 4: ECT1 work flow